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GENERAL SERVICES ADMINISTRATION
WASHINGTON, D. C. 20405

IRM P 2140.1
February 29, 1984

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GSA ORDER

SUBJECT: Systems Management

1. Purpose. This order transmits a handbook on Systems Management.

2. Applicability. The handbook applies to all organizational elements of GSA.

3. Background.

a. Organizational policies, functions, and responsibilities affecting ADP were redefined by GSA Policy Manual, (ADM P 1000.2B) CHGE 25 and GSA Organization Manual, (OHR P 5440.1) CHGE 34. These changes were a result of the Paperwork Reduction Act of 1980, (Pub. L 96-511), which requires a senior official to manage each agencys ADP program. The result is an Internal GSA ADP Program with centralized planning, policy, procedures, and standards but with decentralized execution.

b. The Systems Management Handbook complements the ADP Management Handbook (IRM P 5400.1), which summarizes major aspects of the GSA ADP program. The handbook provides procedures for planning, analyzing, designing, acquiring and developing, and operating and maintaining GSA's ADP systems.

4. Reports. Documentation required under this handbook is exempt from reports control.

Frank J. Carr

FRANK J. CARR
Assistant Administrator for
Information Resources Management

Distribution A; B; F; G

Attachment

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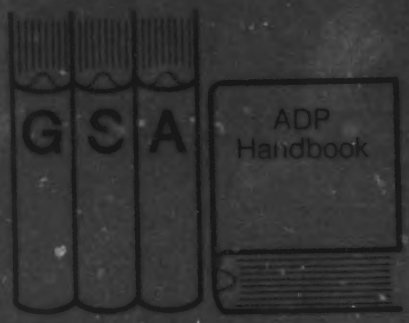

Systems Management

General Services Administration
Office of Information Resources Management
Office of GSA Information Systems

SYSTEMS MANAGEMENT

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CHAPTER 1. INTRODUCTION

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Figure 1-3. ADP systems management requirements

CHAPTER 1. INTRODUCTION

PART 1. GENERAL

1. Purpose. ADP systems management identifies the phases in the life of ADP systems (see fig. 1-1) and describes the tasks of those phases.

2. Objectives. ADP systems management:

a. Establishes processes and procedures for managing the life of ADP systems;

b. Provides technical and administrative guidelines for the tasks of the system life;

c. Identifies ADP documentation requirements;

d. Establishes quality assurance reviews and checkpoints; and

e. Defines system responsibilities and approval.

3. Background. Organizational functions and responsibilities for ADP are redefined in the GSA Organizational Manual, (OHR P 5440.1). ADP personnel can now give support to services and staff offices with substantial ADP requirements. Decentralized GSA ADP resources are to be managed under ADP policy, standards, and procedures.

4. Applicability. Use this handbook for GSA ADP systems throughout all phases of each system's life. Develop input to the GSA 5-Year Strategic Plan for Automated Information for new systems following this handbook. When the new system is identified in the plan, given an activity number and approved, it is developed, operated, and maintained under GSA ADP management procedures.

5. Organizational responsibilities.

a. Services and staff offices with full-time ADP staffs must manage all phases of their ADP systems.

b. Services and staff offices without full-time ADP staffs are supported by the Office of GSA Information Systems.

c. Regional offices manage all phases of their regionally unique systems.

d. The Office of GSA Information Systems prepares ADP system management guidelines and ensures that they are used properly.

6. Phases. ADP systems management requires identifying and executing all tasks to express an idea for potential automation and to continue it through development and operation. This requires documenting the tasks and conducting quality assurance reviews. There are five life cycle phases to the ADP systems management process:

a. Phase I Planning;

b. Phase II Analysis;

c. Phase III Design;

d. Phase IV Acquisition and development; and

e. Phase V Operation and maintenance.

7. Standards. Use this ADP Systems Management handbook, IRM P 2140.1, and the Quality Assurance handbook, IRM P 2170.1, instead of the Federal Information Processing Standards (FIPS PUB) Guidelines, numbers 38 and 64. With this exception, the Federal Information Processing Standards Publications must be followed as the GSA guidelines for ADP. This includes both publications labeled "standards" and those labeled "guidelines". They are used for all applications unless a substitute is issued, or waiver given, by the Office of GSA Information Systems. ADP audits are to be conducted to ensure compliance.

8. ADP management references. The primary reference for the GSA ADP management program is the ADP Management Handbook, IRM P 5400.1. The handbook is a guide to, and summary of, the ADP management areas. It is intended for senior management and as a reference to the overall ADP management program. For each chapter in IRM P 5400.1 there are procedures in corresponding IRM 2100 series documents. The procedural documents are the guides for executing the ADP program, and are intended for the project management and execution levels. A cross-reference between the IRM P 5400.1 document and the IRM 2100 series procedures is shown in fig. 1-2.

9. Document retention. The system owner retains all ADP systems documentation for the life of the system. Should the system be terminated and replaced by a process that still performs some of the functions, the system owner can decide what is to be kept.

10 and 11. Reserved.

ADP Systems Life Cycle Phases

- Planning
- Analysis
- Design
- Acquisition and Development
- Operation and Maintenance

Figure 1-1. ADP Systems Life Cycle Phases

GSA ADP Management Reference

ADP Management Handbook IRM P 5400.		Corresponding ADP Management Procedures IRM 2100 Series
Chapter 1	Introduction	2100.
Chapter 2	Acquisition and Contract Administration	2120.
Chapter 3	Management Planning	2130.
Chapter 4	Systems Management	2140.
Chapter 5	Inventory Management	2150.
Chapter 6	Computing Resources and Data Communications	2160.
Chapter 7	Quality Assurance	2170.
Chapter 8	Data Base Management	2180.
Chapter 9	Cost Accounting	2190.

Figure 1-2. GSA ADP Management Reference

PART 2. SYSTEMS MANAGEMENT

12. Introduction. This part shows the relationship among the life cycle phases, documentation, and quality assurance reviews (see fig. 1-3).

13. Phase I Planning.

a. Purpose. To make a preliminary determination of ADP needs and identify prospective strategies for meeting the needs.

b. Description. Develop an idea for potential ADP application. State mission tasks and identify deficiencies relating to ADP. Perform a preliminary analysis to determine the required functions and to obtain enough data to decide if the automation idea should be pursued into the analysis phase. If the idea appears worthy of further investigation, develop a systems management strategy.

c. Procedure. Follow chapter 2 to complete Phase I planning.

d. Documentation. Use the information developed during this phase as activity input to the GSA 5-Year Strategic Plan for Automated Information. The plan is the documentation requirement, but retain the materials used to develop the input for audits and substantiation.

e. Quality assurance review. Review requirements for ADP systems at the planning phase are stated in IRM 2100.3. When the GSA 5-Year Strategic Plan for Automated Information is approved, the planning phase is completed.

14. Phase II Analysis.

a. Purpose. To define the functional requirements for the system.

b. Description. Define the functional requirements in enough detail to determine system architecture and software specifications. Identify data characteristics, establish performance criteria, and determine processes and interfaces. When the system requirements review is approved, the next phase begins.

c. Procedures. Use chapter 3 to complete the Phase II Analysis.

d. Documentation. Prepare the systems requirement document during the analysis phase. (see ch. 3-31).

e. Quality assurance review. The systems requirements review must be completed and approved before beginning the ADP system design phase. (IRM P 2170.1, ch. 2).

15. Phase III Design.

a. Purpose. To propose a design to meet the functional requirements identified in Phase II.

b. Description. Create the design proposal, prepare the cost-benefit analysis, recommend a system, and prepare a project plan. The work may be done in-house or by a contractor and should result in a definitive design or a proposal for experimentation or for prototyping. When the design proposal review is approved, the next phase begins.

c. Procedures. Use chapter 4 to complete Phase III Design.

d. Documentation. Prepare the following documents during the design phase:

(1) Design proposal (see ch. 4-27);

(2) Risk analysis (see ch. 4-28); and

(3) Project plan (see ch. 4-29).

e. Quality assurance review. The design proposal review must be completed and approved before beginning the acquisiton and development phase. (IRM P 2170.1, ch. 3).

16. Phase IV Acquisition and development.

a. Purpose. To acquire or develop the resources needed to meet system requirements.

b. Description. Acquire and install the hardware, data communications, and software. Prepare plans for activities such as benchmarking, implementing, and training. Prepare facility modifications, write application software specifications, develop the software, and test the system. When the system acceptance review is approved, the next phase is entered.

c. Procedure. Use chapter 5 to complete Phase IV Acquisition and development.

d. Documentation. Prepare the following documents during the acquisition and development phase of an ADP systems's life:

(1) Data processing manual (see ch. 5-58);

(2) User manual (see ch. 5-59);

(3) Operation manual (see ch. 5-60); and

(4) System acceptance report (see ch. 5-61).

e. Quality assurance review. The system acceptance review must be completed and approved before beginning the operation and maintenance phase. (IRM P 2170.1, ch. 4).

17. Phase V Operation and maintenance.

a. Purpose. To operate the system to fulfill the requirements for which it was developed, and to monitor, maintain, and modify the system as necessary.

b. Description. Operate the system to accomplish the production objectives for which it was designed. Run, change, or repair the system as necessary. Prepare resource utilization and efficiency reports and conduct periodic postimplementation reviews to ensure that the system still efficiently meets requirements.

c. Procedures. Use chapter 6 to conduct Phase V Operation and maintenance.

d. Documentation. The documentation for the operation and maintenance phase of a system's life is an on-going process. The type, amount, and detail of the documentation is dependent upon the complexity, problems, stability, and future of the system. No formal presentation is required, but auditable documentation must be available to report facts and conclusions of, and substantiate the decisions made during, the operation and maintenance phase. (see ch. 6, pts. 2 thru 4).

e. Quality assurance review. Postimplementation reviews are conducted periodically during the operational life of each system. (IRM P 2170.1, ch. 5).

18 thru 20. Reserved.

ADP Systems Management Requirements

PHASE I	PHASE II	PHASE III	PHASE IV	Phase V
Planning	Analysis	Design	Acquisition& Development	Operation& Maintenance
Life Cycle Documentation Requirements				
• 5-Year Strategic Plan for Automated Information	• System Requirements	• Design Proposal • Risk Analysis • Project Plan	• Data Processing Manual • User Manual • Operation Manual • System Acceptance Report	On-going See Note
Quality Assurance Review Requirements				
• Reviews Per IRM 2100.3	• System Requirements Review	• Design Proposal Review	• System Acceptance Review	• Postimplementation Reviews

Note: Logs and records kept in this phase are used for Postimplementation Reviews and become the basis for input to Phase I in the event of major modification

Figure 1-3. ADP Systems Management Requirements

ADP Systems Management Requirements

CHAPTER 2

CHAPTER 2. PLANNING

PART 1. GENERAL

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Figure 2-1. Phase I Planning

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System life cycle resources estimate	24
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CHAPTER 2. PLANNING

PART 1. GENERAL

1. Purpose. To define ADP requirements and identify prospective strategies for meeting those requirements. (see fig. 2-1)

2. Objectives. The ADP systems planning phase:

a. Identifies potential ADP needs;

b. Collects and presents ADP planning data;

c. Provides input for the GSA 5-Year Strategic Plan for Automated Information;

d. Investigates ADP life cycle strategies and resource alternatives; and

e. Promotes the uniform agency preparation of ADP planning.

3. Tasks. The effort and level of detail are to be commensurate with the size, complexity, and importance of the system. The systems management procedures and quality assurance reviews apply to both in-house and contracted efforts. The tasks are:

a. Conduct mission analysis;

b. Conduct preliminary analysis; and

c. Develop life cycle strategy.

4. Responsibilities.

a. Each service and staff office with a full-time ADP staff prepares and submits its own ADP planning materials.

b. The Office of GSA Information Systems provides planning assistance to service and staff offices without full-time ADP staffs.

c. Each region prepares and submits, through the Associate Administrator for Operations, its own ADP planning materials for its regionally unique systems.

d. ADP plans are reviewed by the Office of GSA Information Systems and consolidated into the GSA plan.

5. Documentation. Materials prepared during the planning phase are used to develop the input for the GSA 5-Year Strategic Plan for Automated Information. The approved plan, including an activity number for the system, meets the documentation requirements of the planning phase; however, the plan development materials are retained for audits, reference, substantiation, explanation, or clarification.

6. Quality assurance. The reviews required by IRM 2100.3 satisfy the quality assurance review requirements for the planning phase.

7. Reserved.

Phase I Planning

Tasks

- Perform Mission Analysis
- Conduct Preliminary Analysis
- Develop Life Cycle Strategy

Documentation

- 5-YEAR STRATEGIC PLAN FOR AUTOMATED INFORMATION

Quality Assurance Review

- Reviews per IRM 2100.3

Figure 2-1. Phase I Planning

PART 2. MISSION ANALYSIS

8. Mission statement. State the mission of the service or staff office (SSO), primary functions, scope, organization structure, and operation environment.

9. Mission tasks. Describe the primary tasks required by the SSO to support the mission and include, or expand on, the tasks specifically affected by ADP services.

10. Current support. Provide a functional explanation and an estimate of that portion of the requirements that are presently being supported.

11. Technical and functional deficiencies. List functional and technical deficiencies that prevent satisfactory support of the mission tasks. Explain any circumstances (such as changed mission, increased volume, etc.) that may have caused the deficiency.

12. Management goals. State SSO goals for eliminating the deficiencies, and provide priorities, timing, and future plans. Also, include plans that may affect the process selected to eliminate the immediate deficiencies.

13. Constraints. Identify constraints that could limit the exploration of alternate ways of correcting the mission deficiency. This includes organizational and logistical limitations, time, interfaces, legal or legislative restraints, and funding.

14 and 15. Reserved.

PART 3. PRELIMINARY ANALYSIS

16. Functions. State the deficiencies that this project is to correct. Identify existing functions absorbed, modified, or included in the new system/process.

17. Requirements. Identify the inputs, processing, and outputs required to correct the deficiencies. Volumes, storage, processing locations and procedures, and distribution must be estimated, but record specifications and processing details are not yet needed.

18. Resource estimates. Show the current level of resources (personnel, equipment types, funding, etc.) being devoted to functions that would become part of this project. This is a preliminary estimate and is not to include the operational aspects of resources or how they would be affected by a new system. From preliminary requirements, estimate the new or additional equipment needs, software development time and resources, maintenance resources, and cost of correcting the deficiencies. The estimates need not be developed by doing a full-scale analysis, but may be made by using algorithms or comparisons. Estimates must be accurate enough to permit the decision whether to proceed to the analysis phase. The estimates are refined during the analysis and design phases should the preliminary projections warrant a continued study.

19. Reserved.

PART 4. LIFE CYCLE STRATEGY

20. System objectives. List the major system performance objectives, such as:

a. Reduced personnel and equipment costs;

b. Increased processing speed (reduced turnaround time);

c. Increased productivity;

d. Improved management information services;

e. Improved controls over automated decision-making systems; and

f. Compliance with regulations.

21. Assumptions and constraints. List any restrictions that affect the development of the life cycle strategy, such as:

a. Operational life of the proposed system;

b. Period of time for comparing with alternative system;

c. Interaction of the proposed system with other systems and organizations;

d. Predefined input, processing or output specifications;

e. Financial contraints;

f. Legislative and policy constraints;

g. Changes of hardware, software, or operating environment; and

h. Availability of information and resources.

22. System life expectancy. Give a time estimate for each of the system's phases, including analysis, design, acquisition and development, and operation and maintenance. Also, show any predetermined dates (such as scheduled elimination date for an existing system).

23. Recommended life cycle strategy. Develop a strategy for fulfilling system objectives that address such issues as:

a. In-house or contract support (OMB Circulars A-76, Policies for Acquiring Commercial or Industrial Products and Services Needed by the Government, and A-109, Major System Acquisitions apply);

b. Immediate vs long-range needs and planning;

c. Centralized vs decentralized processing;

d. A comprehensive system or a partial, less costly one; and

e. Conventional, full-scale development; a pilot installation; or prototype.

24. System life cycle resources estimate. Estimate the resources required for each phase of the life cycle for the proposed strategy. The resources include personnel and cost (for contracts, equipment, etc.). Like the preliminary analysis estimates, these figures need be only accurate enough to determine whether the strategy should be pursued to the next phase. Unlike the preliminary analysis, these estimates apply to a specific strategy.

25. Alternate strategies. Recommend a life cycle strategy, including an acquisition strategy, however, identifiable alternatives must be evaluated. The advantages and disadvantages of each are to be stated, and the reasons for not recommending them given.

26. Interim measures. Assess the immediacy of needs and how they can be met and incorporated into the final system.

27. Impacts of project redirection. Evaluate the impacts of project redirection or termination at each phase. Show the effect on the mission, the effort required to return to the previous system, and the impact on related activities.

28 thru 30. Reserved.

CHAPTER 3. ANALYSIS

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Figure 3-2. System requirements cover sheet

CHAPTER 3. ANALYSIS

PART 1. GENERAL

1. Purpose. To define the functional requirements for the system. (see fig. 3-1).

2. Objectives. The analysis phase:

   a. Identifies the current process for meeting the functions;

   b. Identifies deficiencies in the current process; and

   c. Defines new system requirements.

3. Tasks. The effort and level of detail are to be commensurate with the size, complexity, and importance of the system. The systems management procedures and quality assurance reviews apply to both in-house and contracted efforts. The tasks are:

   a. Describe the current system;

   b. Develop functional requirements; and

   c. Document the analysis phase activities and results.

4. Responsibilities.

   a. Each service and staff office with a full-time ADP staff analyzes its requirements, prepares the documentation, and conducts the quality assurance review.

   b. The Office of GSA Information Systems provides analysis assistance, conducts quality assurance reviews, and administers contracts for those services and staff offices without full-time ADP staffs.

   c. Each region analyzes its requirements, administers its contracts, and conducts quality assurance reviews for regionally unique systems.

   d. The Office of GSA Information Systems furnishes systems management guidelines and ensures that GSA ADP policy, standards, and procedures are properly followed during each life cycle phase.

5. Documentation. The systems requirements document is prepared during the analysis phase. Procedures for preparing it are described in pt. 4 of this chapter.

6. Quality assurance. The system requirements review is made after all functional requirements are defined. The review is made under IRM P 2170.1, chapter 2, System Requirements Review.

7. Reserved.

Phase II Analysis

Tasks

- Describe the Current System
- Develop Functional Requirements
- Document the Analysis

Documentation

- System Requirements

Quality Assurance Review

- System Requirements

Figure 3-1. Phase II Analysis

PART 2. CURRENT SYSTEM DESCRIPTION

8. Functional summary. Identify and briefly describe the functions of the current system. Indicate those functions to be absorbed by a new system. This is a general description based on the information obtained in Phase I. If no current system exists, explain the reasons for the new functions.

9. Responsibilities. List the organizations responsible for the various functions of the existing system and include the number, grade, and series of the personnel, and the percentage of time spent on the system.

10. Equipment. List equipment used by the existing system and indicate the portion of time or resource of that equipment dedicated to the existing system.

11. Inputs/outputs. Describe inputs and outputs, including forms, data elements, media, geographical location, sequences, distribution, volumes, frequency, retention and accuracy requirements for the existing system.

12. Processing procedures. List the sequence of processing events; personnel responsibility; backup, restart and recovery capability; calculations and manipulations; and equipment used. Provide processing and/or hierarchical charts. Describe both manual and those automated processes, and give a distribution of the effort and resources required for each.

13. Cost. Present a cost analysis that shows the system cost for current functions and for those that would still be required. Show costs for equipment, personnel, etc., and show costs by functions.

14. Deficiencies and limitations. Explain why the existing system can not meet the requirements proposed or why it is inefficient in doing so.

15 thru 17. Reserved.

PART 3. FUNCTIONAL REQUIREMENTS

18. Performance objectives. State the reasons for the system; specifically, what it will accomplish in relation to the mission.

19. System functional description. Identify and briefly describe each major functional entity that is needed. This list will be expanded to identify specific functional requirements and system design specifications. If experimentation or prototyping are to be done, explain the potential benefit. Justify all activities which can not be analyzed.

20. Inputs/outputs. Explain and show examples of the data inputs. Specify the format, range of values, accuracy, volumes and sources, and develop data input edit criteria where requirements are definite. All I/O requirements must be sufficiently defined to permit development of a system design proposal. Provide examples and explanations of the data outputs required of the system. Include descriptions or examples of hard copy reports (routine, situational and exception) as well as graphic or display reports and formats, volumes, distribution, etc., where available. If unknown, I/O requirements are developed during Phase IV.

21. Processes. Show processes and data manipulations, including formulas, mathematical processes, source of input, transfer of output, retention criteria, and interfaces with other processes and data.

22. Data characteristics. Describe individual and composite data elements, their related coded representations (if already known), as well as relevant dictionaries, tables, and reference files. Estimate total storage requirements.

23. Performance criteria.

a. Accuracy. Mathematical, logical, legal, transmission.

b. Validation. Approach to be taken; this will not include the details of an acceptance and validation test.

c. Timing. Response, processing, data transfer and transmission throughput.

d. Flexibility. For changes in modes of operation, environment, interfaces, accuracy and validation, and enhancements.

24. Interfaces. Reference any existing systems that must be interfaced; include hardware, data communications, and processing requirements mandated by either manual or automated systems. Indicate the reason for the interface and any options for compliance.

25. Failure contingencies. Describe and justify failure backup requirements. (i.e. backup must be available within 24 hours to meet payroll).

26. Security/audits. Specify the security and privacy requirements protect the applications software, the data files, and their access. State all requirements for system access control and auditing, includ change monitoring.

27 thru 29. Reserved.

PART 4. DOCUMENTATION

30. Requirements. The project leader has the responsibility for preparing the system requirements document with assistance from other project team members and organizations.

31. System requirements document. The system requirements document consists of an identifying cover sheet and the document itself. Parts 2 and 3 of this chapter describe the information to be documented.

a. Cover sheet. The cover sheet should be like the one in fig. 3-2.

b. System requirements. Because the requirements for systems vary, a single format is not required. The document should present, in narrative and chart form, the following information developed for the system requirements; justify omitted areas.

(1) Current system description. Omit this section if no system currently exists.

(a) Functional summary (see ch. 3-8);

(b) Responsibilities (see ch. 3-9);

(c) Equipment (see ch. 3-10);

(d) Inputs and outputs (see ch. 3-11);

(e) Processing procedures (see ch. 3-12);

(f) Cost (see ch. 3-13); and

(g) Deficiencies and limitations (see ch. 3-14).

(2) Functional requirements.

(a) Performance objectives (see ch. 3-18);

(b) System functional description (see ch. 3-19);

(c) Inputs/outputs (see ch. 3-20);

(d) Processes (see ch. 3-21);

(e) Data characteristics (see ch. 3-22);

(f) Performance criteria (see ch. 3-23);

(g) Interfaces (see ch. 3-24);

(h) Failure contingencies (see ch. 3-25); and

(i) Security/audits (see ch. 3-26).

c. Distribution. The system owner prepares the distribution list. A copy must be sent to:

Systems Assurance Branch (KGSS)
18th & F Streets, NW
Washington, DC 20405

32. Reserved.

PHASE II ANALYSIS

SYSTEM REQUIREMENTS

SYSTEM NAME: (title)

SYSTEM OWNER: (organization)

5-YEAR STRATEGIC PLAN FOR AUTOMATED INFORMATION REFERENCE: (activity number)

PHASE II PROJECT LEADER: (name)
(building, room number)
(telephone)

SYSTEMS ASSURANCE ANALYST: (name)

PROJECT TEAM MEMBERS: (names, organizations)

COMPLETION DATE: _____

PROJECT LEADER	DATE	SYSTEMS ASSURANCE ANALYST	DATE
APPROVAL:		CONCURRENCE:	
SYSTEM OWNER	DATE	SYSTEMS ASSURANCE (KGSS)	DATE

Figure 3-2. System Requirements Cover Sheet

CHAPTER 4

CHAPTER 4. DESIGN

PART 1. GENERAL

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Project plan	29
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Figure 4-3. Design proposal cover sheet

Figure 4-4. Risk analysis cover sheet

Figure 4-5. Project plan cover sheet

CHAPTER 4. DESIGN

PART 1. GENERAL

1. Purpose. To propose a system design for meeting the functional requirements. (see fig. 4-1)

2. Objectives. The design phase:

a. Proposes a design for meeting the new requirements and

b. Prepares a project plan showing milestones, tasks, schedule, and resources for developing and implementing the proposed system.

3. Tasks. The effort and level of detail are to be commensurate with the size, complexity, and importance of the system. The systems management procedures and quality assurance reviews apply to both in-house and contracted efforts. The tasks are:

a. Evaluate design alternatives;

b. Propose a system design;

c. Prepare a project plan; and

d. Document the design.

4. Responsibilities.

a. Each service and staff office with a full-time ADP staff proposes its design, prepares the documentation, administers its contracts, and conducts the quality assurance review.

b. The Office of GSA Information Systems provides design assistance, conducts quality assurance reviews, and administers contracts for those services and staff offices without full-time ADP staffs.

c. Each region proposes its design, administers its contracts, and conducts quality assurance reviews for regionally unique systems.

d. The Office of GSA Information Systems furnishes life cycle guidelines and ensures that ADP Policy, standards, and procedures are properly followed during each life cycle phase.

5. Documentation. The following documents are prepared during the design phase:

a. Design proposal;

b. Risk analysis; and

c. Project plan.

Procedures for preparing these documents are described in pt. 4 of this chapter.

6. Quality assurance. The design proposal review is made after a system design has been proposed and a project plan prepared. The review is conducted under IRM P 2170.1, chapter 3, Design Proposal Review.

7. Reserved.

Phase III Design

Tasks

- Evaluate Design Alternatives
- Propose a System Design
- Prepare a Project Plan
- Document the Design

Documentation

- Design Proposal
- Risk Analysis
- Project Plan

Quality Assurance Review

- Design Proposal

Figure 4-1. Phase III Design

PART 2. DESIGN PROPOSAL

8. General. More than one design may satisfy the functional requirements; however, select the most economical and efficient design. To determine which alternative is best, evaluate each alternative against preliminary criteria, and then apply further criteria to those that still remain as viable alternatives. The result of this further evaluation determines which alternative is the recommended Design Proposal.

9. Preliminary evaluation. For a design proposal to be viable it should be technically, operationally, and economically feasible. By establishing preliminary evaluation criteria it may be recognized, without a detailed evaluation, that some proposals are not feasible.

a. Establish criteria for a preliminary evaluation for such factors as:

(1) Cost. Developmental and operational costs for the life cycle of the system.

(2) Life cycle. Development or delivery time and useful life of the system.

(3) Flexibility. Ability of the design to accommodate changes in policy, procedure, environment, etc.

(4) Maintenance. Requirements and effect of the operation.

(5) Operations. Personnel and facility to run the system.

(6) Training. The level of complexity and amount of training required.

(7) Organizational impact. Effect of the design on established organizational responsibilities and division of functions.

(8) Logistics. Communications requirements resulting from geographic or functional separations.

(9) Sensitivity. Ability of the system to respond to changes in volume, interface, workload mix, timing, etc.

(10) Complexity. Interrelation, such as the impact of one function or piece of equipment on others.

b. Evaluate each alternative against the criteria and explain the evaluation process and results for each.

10. Alternative design proposals. For each alternative meeting the criteria of the preliminary evaluation, further define, describe, and evaluate the following:

a. System description. Present the overall system concept and describe how it meets the functional requirements.

b. Equipment. Describe new equipment requirements and required changes to current equipment.

c. Software. Describe new software requirements and needed modifications to existing applications and support software.

d. Organizations. Describe organizational, personnel and skill requirement changes.

e. Operations. Describe operational effects on areas such as user operating procedures, operating center procedures, operating center and user retrieval, output reporting, and system failure consequences and recovery procedures.

f. Development. Describe developmental impacts such as user support requirements, data base development, system test requirements, privacy and security implications.

g. Site. Describe special building modification requirements.

h. Cost analysis. The procedure used for cost preparation and presentation is consistent with FIPS PUB 64 except for the additional requirement that A-76 projects require in-house and contract comparisons. The cost comparison handbook, which is in Part IV of the supplement to OMB Circular A-76, is to be used for A-76 studies. For each applicable cost, indicate if it is for contracted support or in-house resources.

(1) Non-recurring costs. These are one-time costs in the development and acquisition process.

(a) Site. The cost of erecting or modifying a site and surrounding facilities to meet the needs of the proposed system, e.g., costs to enlarge a computer room, and additional space required for personnel involved in this process, etc.

(b) ADP equipment. The cost for hardware, e.g., CPUs, disk drives, etc.

(c) Data communications. The cost for data communications hardware, communication lines and dedicated data communications software.

(d) Software purchase. The cost for system software packages procured for the direct support of the proposed system.

(e) Database development. The cost of implementing database system software and database applications software.

(f) Software development. The cost of implementing application programs.

(g) Studies. The cost of studies associated with the requirements, design, development or implementation of the proposed system.

(h) Conversion. The cost of converting present data and program logic.

(i) Procurement. The cost of procuring hardware, software and data communications such as RFP preparation, vendor evaluation, and contract preparation.

(j) Training. The cost of training, including user, operations, and management training.

(k) Travel. The cost for visits to sites or regions outside the main agency complex.

(l) System test. The cost of evaluating the system.

(m) Parallel operations. The cost of running parallel operations for the old system and the proposed system.

(n) Management overhead. The cost of management interface in the development process defined in terms of hours required for meetings, reviews and administrative functions associated with continued system operation, etc.

(2) Recurring costs. These are costs that continue throughout all, or most of, the system life.

(a) Maintenance and lease of ADP equipment. The cost for lease and/or maintenance contracts for ADP equipment.

(b) Timesharing. The cost of buying computer time from a commerical source.

(c) Communications maintenance. The cost for the rental, lease or maintenance of data communications equipment, services and facilities.

(d) Software maintenance. The cost of maintaining application software.

(e) Personnel. The salaries and fringe benefits for operations, data entry, and other personnel assigned to the system. Part-time activities should be prorated accordingly.

(f) Training and travel. The cost of training and travel for new employees and upgrades.

(g) Space occupancy. The cost of equipment space, personnel and support facilities, and administrative offices.

(h) Supplies and utilities. The cost of both technical and administrative supplies.

(i) Security and privacy. The cost of security guards, security devices, etc.

(3) Present value cost. The total annual cost can be converted to present value cost for each year of the system life. The present value will give a more equitable base when alternatives have a wide dispersion in the funding years. A percentage rate must be applied to each year's cost to calculate the present value and aggregate the total system cost. Refer to FIPS PUB 64 and OMB Circular A-94 (revised March 27, 1982) when present value calculations are required.

(4) Non-recurring benefits. These are one-time benefits that have a dollar value. The benefits may occur at any point in the life cycle, but they are not continuing benefits. The alternative benefit calculation is based on the alternative(s) with which it is being compared (usually the present system).

(a) Cost reduction. The value of eliminated owned equipment excessed equipment and inventory, eliminated cash-on-hand accounts, or any other one-time source of quantifiable benefit.

(b) Value enhancement. The value of additional tangible procurements (depreciable, not consumable) and improvements to owned facilities and equipment.

(5) Recurring benefits. These are benefits received throughout all, or most of, the system life. They are quantifiable and comparable (for analysis) with the recurring costs.

(a) Maintenance and lease of ADP equipment. The savings on ongoing lease and/or maintenance contracts for ADP equipment.

(b) Communications maintenance. The savings on rental, lease or maintenance of data communications equipment, services, and facilities.

(c) Software maintenance. The projected savings on the maintenance of application software.

(d) Personnel. The salaries and fringe benefits saved (net savings) for operations, data entry, and other personnel.

(e) Training and travel. Savings due to less training and travel (as compared with other systems).

(f) Space occupancy. Savings on equipment space, personnel and support facilities, and administrative offices.

(g) Supplies and utilities. Reduction of both technical and administrative supplies.

(h) Security and privacy. Savings on security guards, devices, etc.

(6) Intangible benefits. Many important benefits can be received from a system without being able to easily quantify them, such as:

(a) Faster processing;

(b) Lower error rate;

(c) Enhanced organizational image;

(d) Improved morale;

(e) Simplified procedures; and

(f) Standardization.

These benefits, in many cases, can be quantified, but not always accurately; therefore, they should be treated so as not to distort the analysis.

i. Cost/benefit analysis. The cost/benefit analysis is a valuable tool for alternative selection analysis, but it is limited to quantifiables and, therefore, should not be over-emphasized in developing a recommendation.

The cost/benefit analysis is prepared using fig. 4-2 as a guide. Show:

(1) Costs

(a) Non-recurring costs. Include non-recurring costs (capital and other), such as studies, personnel training, site modifications, supplies and security procedures. Total the non-recurring costs.

(b) Recurring costs. Include recurring costs such as rental, maintenance, utilities, data communications and personnel. Total the recurring costs.

(c) Total annual cost. Total the non-recurring and recurring cost subtotals for each year of the system life (see fig. 4-2, entry 1).

(d) System life cost. Calculate the total cost over the system life by summing the total costs for all years of the system life (entry 2).

(e) Present value cost. Calculate present value cost over the entire system life using present value factors based on the discounting methods in OMB Circular A-94 (entry 3).

(f) Residual value estimate. Calculate the remaining economic value of ownership of all ADP resources as of the last month of the system life (entry 4).

(g) Present value factor. Show the rate used for adjusting values to present value (entry 5).

(h) Discounted residual value. Use the present value factor to calculate the discounted residual value (entry 6).

(i) Adjusted cost. Calculate the adjusted cost by subtracting the discounted value (entry 6) from the total present value cost (entry 3). Place this value in entry 7.

(2) Benefits.

(a) Annual tangible benefits. Enter the quantifiable benefits for the year of the life cycle in which the benefits are realized (entry 8).

(b) System life benefit. Calculate the total benefit for all years of the life cycle (entry 9).

(c) Present value benefit. Adjust the benefits over the system life cycle to their present value (entry 10).

(3) Net present value. Calculate the net present value (entry 11) by subtracting the adjusted cost (entry 7) from the total present value of benefits (entry 10).

(4) Benefit/cost ratio. Calculate the benefit/cost ratio (entry 12) by dividing the total present value of benefits (entry 10) by the adjusted cost (entry 7).

(5) Payback period. Calculate the year and month in which the sum (in current dollars) of benefits first exceeds the sum of the costs (entry 13).

Intangible benefits must be evaluated to decide whether the proposed system should be developed.

j. Advantages and disadvantages. Explain the advantages and disadvantages of each alternative.

11. Recommended design proposal. State which design is being proposed and why. The proposal is a definitive course of action, and if contract support is used, the contract award is recommended. In addition, provide the following for the recommended Design Proposal:

a. System architecture. Define the system architecture in functional terms. Identify the equipment type (not manufacturer) and the operating capabilities including the specifics for volumes, capacity, times, speed, retention, access, interfaces, display performance, maintenance response, and other technical specifications. Also identify failure contingencies. When the design proposal is approved, this information is used to develop specifications for acquisition and benchmarking.

b. Sensitivity analysis. Assess the extent to which costs and benefits are sensitive to changes in key factors such as length of system life; volume, mix or pattern of workload; requirements; and configuration of equipment or software.

(1) Methodology. Determine the approach, assumptions and model for the sensitivity analysis. Use algorithms where possible to develop sensitivity relationships. Include considerations such as:

(a) Length of system life. The effects of a shorter and of a longer system life.

(b) Volume, mix, or pattern of workload. The effects of variation in the estimated volume, mix, or pattern of workload.

(c) Requirements. The effects of potential changes in requirements resulting from either legislative mandate or changes in functional or organizational structure.

(d) Configuration of equipment or software. The effects of changes in configuration of hardware, software, and data communications.

(e) Assumptions. The effects of alternative assumptions concerning objectives, requirements, and operations. Consider the effects of alternative assumptions concerning inflation rate; residual value of equipment, facilities and software; and length of development.

(2) Sources of data. Identify the sources of data for the sensitivity analysis, and the method of data collection.

(3) Other factors. Identify and explain other factors that cannot be accurately analyzed, but which may qualitatively or quantitatively affect the assessment of costs and benefits of one or more of the alternatives.

c. Risk analysis. Take a cost/beneficial approach to avoid threats to the system caused by natural disasters, security violations, and system failures. Justify costs for the preventative actions specified in the requirements and design of the system, including physical and ADP security and backup. The system owner conducts the analysis and ensures that definitive action is taken, both initially and throughout the life of the system. The Office of Oversight furnishes guidelines for conducting risk analyses, and the Office of GSA Information Systems ensures that they are conducted.

12. Rejected proposals. Explain why each alternative was rejected.

13 thru 15. Reserved.

Cost/Benefit Analysis

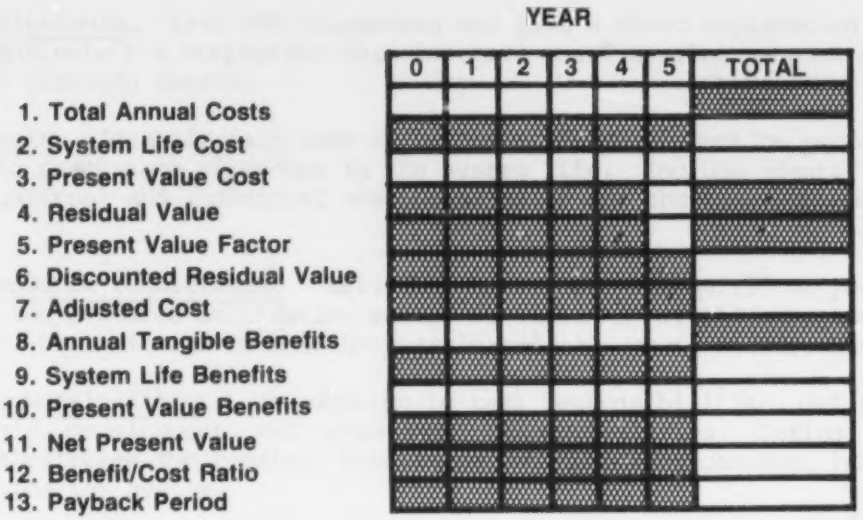

Figure 4-2. Cost/Benefit Analysis

PART 3. PROJECT PLAN

16. Life cycle strategy summary. Review the acquisition strategy and development approach. The acquisition strategy addresses in-house and contract decisions, existing or new equipment and services, shared resources, acquisition timing, resource sources, etc. The development approach includes the system design concept and consideration of data base, centralized versus decentralized processing, interfaces with other systems, phased implementation, system flexibility, and a logical identification and distribution of application software responsibilities.

17. Milestones. List the milestones and give a short explanation of each one. Estimate the completion date for each one. Develop network and project planning charts.

18. Tasks. Identify each task or set of tasks which must be performed in order to reach each milestone in the system life. Include identification of organizational and individual responsibilities for the tasks or portions of them.

19. Resource requirements. Estimate the resources required to perform each task. The resource utilization should be auditable at the milestone level and will be monitored to show both estimated and actual resources used.

20. Responsibilities. In addition to task responsibilities, define system ownership, development, and operational responsibilities. Define responsibilities for funding, submitting and approving changes, and validating the system.

21. Schedule. Prepare a schedule for developing and implementing the system, include time relationships, interdependencies, critical path identification, slack time, and contingencies for critical activities. Include a schedule for document preparation and quality assurance reviews.

22. Contingency plan. Evaluate the impact of project plan changes to identify milestones sensitive to change, and to estimate the potential problems and their effects on the system. Develop contingency plans to resolve them.

23 thru 25. Reserved.

PART 4. DOCUMENTATION

26. Requirements. The project leader has the responsibility for preparing the required documents with assistance from other project team members and organizations. Three documents are required for this phase;

a. Design proposal;

b. Risk analysis; and

c. Project plan.

27. Design proposal. The Design Proposal document consists of an identifying cover sheet for identification information and the proposal itself. Part 2 of this chapter describes the process to be documented.

a. Cover sheet. The cover sheet should be like the one in fig. 4-3.

b. Design proposal. Because the design of systems varies, a single format is not required. The document should present, in narrative and chart form, the following information developed for the Design Proposal; justify omitted areas:

(1) Preliminary evaluations (see ch. 4-9);

(2) Alternative design proposals (see ch. 4-10);

(3) Recommended design proposal (see ch. 4-11, (a) (b)); and

(4) Rejected proposals (see ch. 4-12).

c. Distribution. The system owner prepares the distribution list. A copy must be sent to:

Systems Assurance Branch (KGSS)
18th & F Streets, NW
Washington, DC 20405

28. Risk analysis. The risk analysis document consists of an identifying sheet and the document itself. Chapter 4-11 c, Risk analysis, describes the process to be documented.

a. Cover sheet. The cover sheet should be like that in fig. 4-4.

b. Risk analysis. The content of the risk analysis document and the process for conducting it is the responsibility of the system owner; however, the analysis must follow the guidelines furnished by the Office of Oversight. (see ch. 4-11c)

c. Distribution. The system owner prepares the distribution list. Two copies must be sent to:

Systems Assurance Branch (KGSS)
18th & F Streets, NW
Washington, DC 20405

29. Project plan. The project plan document consists of an identifying cover sheet and the plan itself.

a. Cover sheet. The cover sheet should be like that in fig. 4-5.

b. Project plan. Because the plans for systems vary, a single format is not required. The document, should present, in narrative and chart form, the following information; justify omitted areas:

(1) Life cycle strategy summary (see ch. 4-16);

(2) Milestones (see ch. 4-17);

(3) Tasks (see ch. 4-18);

(4) Resource requirements (see ch. 4-19);

(5) Responsibilities (see ch. 4-20);

(6) Schedule (see ch. 4-21); and

(7) Contingency plan (see ch. 4-22).

(c) Distribution. The system owner prepares the distribution list. A copy must be sent to:

Systems Assurance Branch (KGSS)
18th & F Streets, NW
Washington, DC 20405

30. Reserved.

PHASE III DESIGN

DESIGN PROPOSAL

SYSTEM NAME: (title)

SYSTEM OWNER: (organization)

5-YEAR STRATEGIC PLAN FOR AUTOMATED INFORMATION REFERENCE: (activity number)

PHASE III PROJECT LEADER: (name)
(building, room number)
(telephone)

SYSTEMS ASSURANCE ANALYST: (name)

PROJECT TEAM MEMBERS: (names, organizations)

COMPLETION DATE: _____

_____ _____
PROJECT LEADER DATE

_____ _____
SYSTEMS ASSURANCE ANALYST DATE

APPROVAL:

CONCURRENCE:

SYSTEM OWNER DATE

_____ _____
SYSTEMS ASSURANCE (KGSS) DATE

Figure 4-3. Design Proposal Cover Sheet

PHASE III DESIGN

RISK ANALYSIS

SYSTEM NAME: (title)

SYSTEM OWNER: (organization)

5-YEAR STRATEGIC PLAN FOR AUTOMATED INFORMATION REFERENCE: (activity number)

PHASE III PROJECT LEADER: (name)
(building, room number)
(telephone)

SYSTEMS ASSURANCE ANALYST: (name)

PROJECT TEAM MEMBERS: (names, organizations)

COMPLETION DATE: _____

PROJECT LEADER	DATE	SYSTEMS ASSURANCE ANALYST	DATE
APPROVAL:		CONCURRENCE:	
SYSTEM OWNER	DATE	SYSTEMS ASSURANCE (KGSS)	DATE
		OFFICE OF OVERSIGHT	DATE

Figure 4-4. Risk Analysis Cover Sheet

PHASE III DESIGN

PROJECT PLAN

SYSTEM NAME: (title)

SYSTEM OWNER: (organization)

5-YEAR STRATEGIC PLAN FOR AUTOMATED INFORMATION REFERENCE: (activity number)

PHASE III PROJECT LEADER: (name)
(building, room number)
(telephone)

SYSTEMS ASSURANCE ANALYST: (name)

PROJECT TEAM MEMBERS: (names, organizations)

COMPLETION DATE: _____

PROJECT LEADER	DATE	SYSTEMS ASSURANCE ANALYST	DATE
APPROVAL:		CONCURRENCE:	
SYSTEM OWNER	DATE	SYSTEMS ASSURANCE (KGSS)	DATE

Figure 4-5. Project Plan Cover Sheet

CHAPTER 5. ACQUISITION AND DEVELOPMENT

PART 1. GENERAL

Paragraph Titles	Paragraph Numbers
Purpose	1
Objectives	2
Tasks	3
Responsibilities	4
Documentation	5
Quality assurance	6
Reserved	7

Figure 5-1. Phase IV Acquisition and Development

PART 2. TECHNICAL CONTROL

General	8
System test plan	9
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User validation and acceptance plan	11
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PART 3. EQUIPMENT, SOFTWARE AND DATA COMMUNICATIONS

Equipment and software performance specifications	18
Data communications performance specifications	19
Benchmark evaluation	20
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PART 4. FACILITY

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Space	23
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Climate	25
Safety	26
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Paragraph Titles	Paragraph Numbers
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PART 6. SYSTEM ACCEPTANCE

Development test	42
Hardware, software, and data communications acceptance	43
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Production initiation schedule	50
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User instructions	53
Operation instructions	54
Reserved	55 and 56

PART 8. DOCUMENTATION

Requirements	57
Data processing manual	58
User manual	59
Operation manual	60
System acceptance report	61
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Figure 5-2. Data processing manual cover sheet

Figure 5-3. User manual cover sheet

Figure 5-4. Operation manual cover sheet

Figure 5-5. System acceptance report cover sheet

CHAPTER 5. ACQUISITION AND DEVELOPMENT

PART 1. GENERAL

1. Purpose. To acquire or develop the resources needed to meet the system requirements. (see fig. 5-1)

2. Objectives. The acquisition and development phase:

a. Plans technical control activity;

b. Acquires hardware, data communications, and system software;

c. Acquires or develops application software; and

d. Proves the system ready for production.

3. Tasks. The effort and level of detail are to be commensurate with the size, complexity, and importance of the system. The ADP systems management procedures and quality assurance reviews apply to both in-house and contracted efforts. The tasks are:

a. Plan technical control;

b. Select and test equipment, data communications, and system software;

c. Prepare the facility;

d. Obtain or develop the application software;

e. Test the system;

f. Prepare for system implementation; and

g. Document the acquisition and development activities.

4. Responsibilities.

a. Each service and staff office with a full-time ADP staff acquires or develops (within the delegated authority) its system, prepares the documentation, administers its contracts, and conducts the quality assurance review.

b. The Office of GSA Information Systems provides acquisition and development assistance, conducts quality assurance reviews, and administers contracts for those service and staff offices without full-time ADP staffs.

c. Each region acquires or develops its systems, administers its contracts, and conducts the quality assurance reviews for its regionally unique systems.

d. The Office of GSA Information Systems furnishes systems management guidelines for acquiring and developing systems, and ensures that GSA ADP policy, standards, and procedures are properly followed in each life cycle phase.

5. Documentation. The following documents are prepared during the acquisition and development phase:

a. Data processing manual;

b. User manual;

c. Operation manual; and

d. System acceptance report.

Procedures for preparing these documents are described in pt. 8 of this chapter.

6. Quality assurance. The system acceptance review is conducted before the system is used for production. The review is made under IRM P 2170.1, chapter 4, System Acceptance Review.

7. Reserved.

Phase IV Acquisition and Development

Tasks

- Plan Technical Control
- Select and Test Equipment, Data Communications and System Software
- Prepare the Facility
- Obtain or Develop the Application Software
- Test the System
- Prepare for System Implementation
- Document the Acquisition and Development

Documentation

- Data Processing Manual
- User Manual
- Operation Manual
- System Acceptance Report

Quality Assurance Review

- System Acceptance

Figure 5-1. Phase IV Acquisition and Development

PART 2. TECHNICAL CONTROL

8. General. The size, complexity, and importance of the system may allow consolidation of some technical control plans. If a system is developed entirely by contract support, the system acceptance test plan and the other technical control activities may be in one plan.

Plans for technical control may not be developed completely in exact order. The incremental availability of information may prevent, for example, the data element manipulation Requirements for a system test plan may be known, but the test cannot be completed until the data element name and its file name are given.

9. System test plan. This is a plan for conducting or monitoring a test of the entire system. This plan will furnish the user with the results to be evaluated for system acceptance.

a. Functional summary. Describe the functions of the system.

b. Schedule. Identify the time and place for the test. Identify participating organizations and their responsibility. List the organizations and personnel that develop the plan, conduct the test, review the output, and approve the results.

c. Test resources.

(1) Equipment. Show the expected period of use, types, and quantities of the equipment needed that are not part of the system being tested.

(2) Software. Identify the software that is needed to support the testing, but is not part of the system being tested.

(3) Personnel. List the number and types of personnel to be available during the test from both user and development groups. Include any special requirements, such as multishift operation or key personnel.

d. Method and constraints.

(1) Methodology. Describe the testing method and strategy.

(2) Conditions. Specify the type of input to be used, such as live or test data, as well as the volume and frequency of input, and iterations.

(3) Extent. Indicate the extent of the testing, such as total or partial.

(4) Data recording. Discuss the method for recording the test results such as printouts or file dumps.

(5) Constraints. Indicate anticipated test limitations such as incomplete or partial interfaces, equipment, personnel, and data bases.

e. Test materials. List materials needed for the test and their sources, such as:

(1) Documentation;

(2) Software to be tested and its medium;

(3) Test inputs and outputs; and

(4) Test control software.

f. Test procedure.

(1) Control. Describe the test control, such as manual, semiautomatic or automatic insertion of inputs, sequencing of operations, and recording of results.

(2) Inputs. Describe the input data and input commands used during the test.

(3) Outputs. Describe the output and intermediate data expected as a result of the test.

(4) Procedure. Specify the step-by-step procedures for test setup, initialization, processing, and termination, including test progression or sequencing.

(5) Restart and recovery. Describe the process for ensuring that the system can be restarted or recovered at the designated checkpoints.

10. Benchmark plan. The benchmark plan identifies the responsibilities of the vendor and government, and establishes a procedure for conducting a benchmark. The benchmark plan may be combined with the system test plan if the system is developed by contract. The benchmark compares performance with specifications. The benchmark plan includes:

a. Need for a benchmark. Justify the benchmark.

b. Environment. State the policy and background information pertaining to new equipment or services under evaluation.

c. Responsibilities of vendor and government. Define the basic rules and regulations to ensure smooth, equitable demonstrations. Give a government contact point, and procedures for requesting modifications or clarification, and for coordinating the demonstration.

d. Benchmark team. Determine the benchmark team and its responsibilities, and limitations on the vendor personnel who may be present during a demonstration.

e. Hardware and software requirements. List and justify the hardware or software included in the demonstration.

f. Time. Schedule the benchmark and limit the time given to show successful completion.

g. Test data. Give complete descriptions and restrictions of the test data base.

h. Process. Explain how the test will be conducted and evaluated. Give procedures and acceptance criteria for each specification being evaluated.

11. User validation and acceptance plan. Acceptance planning will be based on satisfaction of functional requirements. Specific files and values will be determined when the test data design is completed. The detailed validation process can be finalized when the system specifications are complete.

a. Validation process. Assign input, process, and output criteria and validation responsibilities. Prepare data to compare a manual (or prior) process with the automated one.

b. Time. List throughput time and sequence requirements.

c. Distribution. List the distribution centers for each input and output, including transfers.

d. Interface. Show the interdependencies of processing systems and the process flows affecting the outputs, and the procedure used to verify them.

e. Retention. Give file retention requirements for successive iterations; show restart and recovery points, and develop criteria for satisfactory execution.

f. Process. Show the algorithms and procedures being tested.

g. Volume. Show the technique used to ensure adequate file sizes and that volume-dependent processing will not saturate the system.

12. Implementation plan. The project plan shows the acquisition strategy and implementation target date; the conversion plan shows the process for converting from the current system to the new one. The implementation plan shows implementation steps and sequence.

a. Implementation strategy. Based on the acquisition strategy, the current system (if one exists), and the project plan, decide: if implementation will be phased; if parallel operations are necessary; if a conversion is necessary; and the best implementation method.

b. Timing. Determine when to implement the system based on information such as new fiscal year, policy effective date, resource availability. Develop an implementation schedule.

c. Responsibility. Identify responsibilities for activities such as site preparation and acceptance, initial procurement of ADP supplies, and implementation coordination.

d. Affected organizations. Identify organizations affected by the implementation and notify them of their preparation responsibilities.

e. Operations. Define operation functions; estimate and commit resources.

13. Conversion plan.

a. Existing functions. Identify the existing functions that will be converted to the new system.

b. Processing. Show the present method of processing, the proposed changes, and the adjustments to the existing system.

c. Software. Identify the system and application software that will still be used, and the changes needed to it.

d. Hardware and data communications. List hardware and data communications that will still be used and specify what effect the conversion will have on it.

e. Files. Identify the files to be used and/or converted, and show retention or resubmission requirements based on iterative processing.

f. Schedule. Identify conversion activities, establish a schedule, and list the participating and reviewing personnel by name and organization.

g. Personnel. Show the number and types of personnel to be retrained or displaced by the conversion.

14. User training plan.

a. Training plan scope and content. Identify the equipment, software, and procedural training needed for management, administration, development, user, and operation personnel.

b. Personnel training requirements. Identify training needs and when the training should be conducted.

c. Presentation methods. Specify if the training will be formal (classroom) or on-the-job, and if all similar training can be conducted at one time or if it must be phased.

d. Training space and equipment. Determine the space required for training, any special training equipment, such as audio-visual, and any technical support equipment such as terminals.

e. Funding. Identify training costs and prepare a budget to include instruction, materials, travel, etc.

f. Training team. Identify the person(s) responsible for negotiating and administering training.

15. Postimplementation review plan. Establisn the time (months from implementation) for the first postimplementation review. Give the estimated system life and a schedule for the remaining postimplementation reviews. Postimplementation reviews should be scheduled as follows:

a. A postimplementation review will be conducted within 12 to 18 months following system installation to ensure that the system functions as designed.

b. Subsequent reviews will be conducted at 50 percent and 80 percent of the system's life, but at least every five years.

c. In addition to the established review schedule, the Office of GSA Information Systems may require additional postimplementation review.

16 and 17. Reserved.

PART 3. EQUIPMENT/SOFTWARE AND DATA COMMUNICATIONS

18. Equipment and software performance specifications. These specifications are for equipment, system software, and utilities, but not application software and data communications. The specifications should address:

a. Run/response time per message/transaction;
b. Throughput time for specified volumes and processes;
c. CPU memory size;
d. Operating system characteristics, utilities, and compilers;
e. Operations complexity/resources;
f. Storage types and volumes;
g. I/O types, speed, volumes;
h. Security;
i. Accuracy/error detection;
j. Interchangeability/compatibility,
k. Data access methods and procedures;
l. Backup/recovery;
m. Downtime tolerances;
n. Maintenance response time and contingencies; and
o. Special performance criteria.

19. Data communications performance specifications. These specifications should address:

a. Response time per message/transaction;
b. Throughput time for specified volumes and processes;
c. Terminal displays/interfaces;
d. Line transmission speed;
e. Transmission techniques;
f. Upgrade capability;
g. Operations complexity/resources;
h. Communications network design;
i. RJE I/O interfaces;
j. Security;
k. Accuracy/error detection;
l. Interchangeability/compatibility;
m. Traffic monitoring/reporting/switching;
n. Backup/recovery;
o. Downtime tolerances;
p. Maintenance response time/contingencies; and
q. Special performance criteria.

20. Benchmark evaluation. The benchmark evaluations will compare the demonstrated performance with the specifications for hardware, system software, and data communications.

c. [illegible] primary purpose of the benchmark. Give the Inform[illegible] package name and the type of benchmark [illegible]munication, etc.).

16. [illegible]utline the evaluation conditions and their

[illegible]t all equipment and system software being

[illegible]. Conduct the evaluation under the benchmark [illegible]ent the results.

e. Pass/fail. [illegible]ess the benchmark as pass or fail; however, explain reasons for the failure. Also, acceptance may be conditional, based on resolution of minor or potential problems.

21. Reserved.

PART 4. FACILITY

22. Structure. The structure must meet the architectural requirements for an office building, but the following should also be considered:

a. Capability of the floor to withstand the equipment weight;

b. A false ceiling or raised floor for plumbing, electrical cables, and data processing lines;

c. Electrical and plumbing systems designed for data processing equipment; and

d. Water sprinkler fire suppression system.

23. Space. Include the following in developing space requirements and designing the facility layout:

a. Equipment space with sufficient room for maintenance and operator access;

b. Storage facility for off-line media and supplies;

c. Office space for systems programers and consultation;

d. Input/output control area;

e. Reference library; and

f. Administrative and supervisory office space.

24. Power. There should be backup to, and regulation of, the power to prevent interrupted computer operation and loss of data. Consider:

a. Raising receptacle boxes from the floor to minimize corrosion and short-circuiting;

b. Installing highly water resistant inter-cabinet cables that have connectors only at the ends;

c. Providing for the computer area power distribution panels to be connected directly to the primary feeders;

d. Physically protecting the cables;

e. Providing filters to reduce power line fluctuations; and

f. Installing auxiliary power.

25. Climate. In addition to personal comfort, base climate control requirements on changes caused by machine operation, and operating and storage climate tolerances for equipment, peripherals, storage media, and supplies.

26. Safety. Include the following to ensure the safety of personnel, equipment, and data:

a. Fire safety.

(1) Proper type and placement of automatic fire extinguishers;

(2) Proper type and placement of smoke detection devices;

(3) Use of automatic sprinkler systems;

(4) Interior fire partitions and external fire walls;

(5) Use of low-flame-spread materials for floor, wall, and ceiling finish;

(6) Off-line storage in fireproof vaults; and

(7) Fire doors.

b. General safety.

(1) Stairwells and emergency stairwells properly lighted, cleared, and easily accessible;

(2) Flammable materials stored away from smoking areas;

(3) Adequate clearance around equipment; and

(4) Wires and cords away from walkways.

27. Security. There are several methods for providing physical security. The risk analysis will determine the best method. Some methods are:

a. Guards at entrances;

b. Automatic access controlled by magnetic card or biometric device;

c. Data set protection controls;

d. Encryption software or hardware;

e. Personal identification system built into the terminals (magnetic card or biometric device);

f. Off-site storage of tapes and disks with pickup and delivery service;

g. Closed circuit television systems to survey the facility and entrances; and

h. Anti-intrusion detection devices.

28. Telephones. Communications for the computer system is described in the data communications specifications; however, voice communications are also required. Telephones should be available from any point in the facility to allow software and hardware analysis and emergency service assistance by telephone.

29. Location. Factors to be considered in choosing a location (or developing a system for a known site) include:

a. Distribution of system inputs and outputs (physical or data communications);

b. Availability of maintenance, repair and supply delivery service;

c. Personnel availability or willingness of personnel to relocate;

d. Availability of a backup system; and

e. Nearness of the operation facility to the user group and maintenance programers and analysts.

30. Cost. The cost for the facility is separated into recurring (operational) and non-recurring (primarily development) costs. The facility cost should be shown by year and life cycle phase, and include (ch. 4-10h):

a. Facility construction or modification;

b. Lease/purchase of land and/or building;

c. Maintenance and repair of facility (including decorations and landscaping);

d. Utilities and insurance; and

e. Custodial services.

31 thru 33. Reserved.

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PART 5. APPLICATIONS SOFTWARE

34. System and subsystem specifications. Divide the tasks into separate entities to facilitate preparing programing specifications and to allow concurrent coding which reduces development time. This also promotes modular testing capability and aids in the identification of change requirements and throughput analysis.

a. Functional requirements grouping. Identify criteria that promotes a logical grouping of functional requirements into separate entities and establish these groups as subsystems.

b. Interfaces. Identify the commonality that links each group of functional requirements to others and show the required sequencing.

c. Inputs/outputs. List the inputs and outputs of each subsystem. Give the origin of inputs and the destination of outputs if they are to be used by other subsystems.

d. Retention. Show data retention requirements for inputs/outputs.

e. Performance. List any specific subsystem performance criteria, such as accuracy, validation, timing, and flexibility.

f. Operating environment. List any restraints placed on the subsystem specifications that are a result of the design proposal, such as equipment, software, interfaces, security and privacy, or operating controls.

g. Naming conventions. Create naming conventions to distinguish subsystems, interfaces, application programs, job control programs, sorts, files, or other identifying information. Establish names, numbers and symbols for the subsystems.

35. Data base design. Identify the data elements to be used throughout the system, those that will link subsystems and processes, and the sort and access requirements for the data elements and the data base.

a. Data identification. Identify the system data elements amd state the subsystem and interface requirements.

b. Software/hardware. List the software and hardware that will be accessing the data.

c. Security/privacy. Specify the data security and privacy requirements.

d. Update. Show the methods and frequency of data updating.

e. Access. List the data elements for sorting and accessing.

f. Volume/retention. Estimate the volume of data to be entered into and drawn from the system, the level of processing activity, and data retention requirements.

g. Data base construction. Develop a data base design (data files or data management system), identifying the data files and their content. Coordinate the final product with the detailed process design and program specifications.

36. Detailed process design. Identify the types and sequences of processing within the subsystems; identify the inputs, their sources, the processes performed on them, and the distribution and interface of the outputs. The input and output record layouts, file names and definitions, program names, and processing algorithms will be coordinated in the data base design and program specifications.

a. Subsystem processing. Identify each process that must be performed within each subsystem. Describe the processes, sequences, inputs and outputs.

b. Interface processing. Identify processing sequences between subsystems. Describe the processes, sequences, inputs and outputs.

c. Failure/backup processing. Identify processes for backup, recovery, and restart.

d. Process charts. For applications and command language programs, show the processing relationships and sequences; use functional flow charts or processing charts. Show the data files and specific elements used. This information is used to develop the program specifications.

e. Program identifications. Identify and name, using the established naming convention, each application and command language program and state its purpose. List the input and output files and data elements to be accessed.

37. Program specifications. Information from the system and subsystem specifications, data base design, and detailed process design, should be extensive enough that specifications for each application and command program can be made. A programer, knowledgeable of the compiler, operating system, and equipment should need no additional information to develop the code.

a. Identification. Give the program name and project for which it will be used. Give the language and machine to be used.

b. Requirements.

(1) Program description. Provide a general description of the program.

(2) Functions. State the functions of the program to be developed. If the program does not fully satisfy a system/subsystem function, show the relationship to other programs which aggregately satisfy that function.

(3) Performance. Specify the performance requirements.

(a) Accuracy. Describe data accuracy requirements imposed on the program, such as:

(i) Mathematical;
(ii) Logical;
(iii) Legal; and
(iv) Transmission.

(b) Validation. Describe the data validation requirements imposed on the program.

(c) Timing. Describe the timing requirements imposed on the program, such as:

(i) Response time;
(ii) Update processing time;
(iii) Data transfer and transmission time; and
(iv) Throughput and internal processing time.

(d) Flexibility. Describe the capability for adapting to requirement changes, such as:

(i) Modes of operation;
(ii) Operating environment;
(iii) Interfaces with other programs;
(iv) Accuracy, validation, and timing; and
(v) Planned changes or improvements.

c. Operating environment.

(1) Equipment. Identify the system's operating equipment. Include information such as:

(a) Processor and size of internal storage;

(b) Storage (on-line and off-line, media, form, and devices);

(c) Input/output devices (on-line and off-line, and capacities); and

(d) Data transmission devices.

(2) Support software. Identify the support software and describe any test programs. If the operation of the program depends on changes to support software, identify the nature and planned date of these changes.

(3) Interfaces. Describe interactions with the operator. Describe interactions with other software, including sequential or procedural relationships and data interfaces.

(4) Storage. Specify the storage requirements, constraints and conditions.

(a) Internal. Describe the use of internal storage areas, including indexing and working areas. Briefly state the equipment constraints and design considerations that affect the use of internal storage.

(b) Device. List by device type all peripheral storage required. Briefly state constraints imposed on storage requirements by each storage device. State requirements for permanent and temporary storage.

(c) Off-line. Describe the form, media, and storage requirements for off-line storage.

(5) Security and privacy. Describe the security and privacy requirements for the program, the inputs, and the data bases.

(6) Controls. Describe the program controls such as record counts, accumulated counts, and batch controls. Identify the sources of these controls.

d. Design characteristics.

(1) Operating procedures. Describe the operating procedures and program functions or requirements. Describe the load, start, stop, recovery, and restart procedures. Describe other interactions of the program with the operator.

(2) Inputs. Give information about the characteristics of each input to the program, such as:

(a) Title and tag;

(b) Format and type of data, such as a record layout;

(c) Validation criteria;

(d) Volume and frequency;

(e) Means of entry;

(f) Source document and its disposition, or specific interface source; and

(g) Security and privacy conditions.

(3) Program logic. Describe the program logic. The flow should be presented in graphic form (flowcharts, decision logic tables, etc.), and supplemented with narratives.

(4) Outputs. Provide information about the characteristics of each output from the program, such as:

(a) Title and page;

(b) Format specifications, such as a report format;

(c) Selection criteria for display, output, or transfer;

(d) Volume and frequency;

(e) Output media;

(f) Description of graphic displays and symbols;

(g) Security and privacy conditions;

(h) Disposition of products; and

(i) Description of display sequences and contents, fixed and variable formats, and display of error conditions.

(5) Data base. Describe the logical and physical characteristics of the data bases used by the program.

(a) Logical characteristics. Identify, define, and describe the relationships among data sets, records, and individual data elements.

(b) Physical characteristics. Describe in terms of this data base, the storage requirements for program data, specific access method, and physical relationships of access (index, device, area), design considerations, and access security mechanisms.

38. Test data design. Develop the program test data and system test data and create a listing of the test data files.

Test data for each program and a comprehensive test data base are required. Program test data may be furnished by the user, developed by the programer, or extracted from the system test data library, depending upon which is most practical. The user should design and create system test data. The items listed should be addressed for each set of data.

a. Test conditions. List the purpose of the test file.

b. Preparation responsibility. List, by name and organization, the person who prepares the test data, how it is prepared, and in what format it will enter the system.

c. Control. State the procedure for modifying the test data base.

d. Negative data. Show the conditions being tested, and list the negative data developed to test these conditions.

e. Output recycling. Identify output generated from test data that must be used for additional iterations through the system, and maintain, for comparison, data listings of these files.

f. Data listings. Maintain a binder of test data listings for each test data file; include the date of the creation/change. For changed files, show the change that was made.

39. Data dictionary. The Data Base Design defines the files of the system and the Detailed Process Design specifies data element processing. In order to complete the cross-reference and to provide a flow/process/interface for each data element through the system, a data dictionary will be prepared.

a. Data element name. Include the title of the data element and its mnemonic name.

b. Description. Describe the purpose of each data element.

c. Source. Give the source (origin) of the data element; if calculated or derived, state the processor algorithm.

d. Termination. Show all outputs that contain the data element; if one is part of a cumulative or derived result, show how it was processed.

e. Files. List all files in which the data element appears. This includes temporary files and history files. For cumulative or processed files using this data element, give the file name, data element number, and process used on the data element.

f. Process. Show the process and sequence in which the data element is manipulated through the system, including branching and decision logic for inclusion, exclusion or termination.

40 and 41. Reserved.

PART 6. SYSTEM ACCEPTANCE

42. Development test. The development test is a preliminary applications software test conducted when the developer completes the system. It is not a system acceptance test; it is a coding test.

a. Objectives. List the specific objectives of the test, including identification of the project, subsystems, job streams, and programs in the test.

b. References. Give references, such as previous test results.

c. Responsibility. State where and when the test is performed. List personnel and their duties.

d. Test method. Describe the test process.

e. Abnormal conditions. List unique conditions, such as dummy files, partial runs, etc.

f. Input. Define the input data used in the test.

g. Output. Describe the data obtained from the test (source, type, limitations, etc.).

h. Analysis. Describe how the test results were analyzed and who approved the results.

i. Accomplishments. Identify specific test accomplishments.

j. Problems. Identify problems encountered.

k. Action. List specific actions to be taken, such as accept test results, perform additional tests, revise coding, etc.

The equipment for the development test must be comparable to that intended for permanent use. The support software, such as compilers, operating systems, data base managers, and utilities should be copies of the software that will be used permanently. The test data is prepared by the developer.

43. Hardware, software, and data communications acceptance. Evaluate the vendor-furnished components of the system in their environment. This includes the hardware, data communications, system software, utilities, compilers, environmental factors (climate control and security), and other system requirements except the data base and applications software. Where

practical, separate acceptance reports should be used for the various segments of the system. The test and report are for the specific hardware installed on site. Unlike benchmarks, this test does not demonstrate equipment type capability; it tests the capability of specific hardware and software, and ensures satisfactory performance of the entire system configuration. Each piece of hardware and software must meet functional requirements and design specifications, and interface properly. This test may uncover design errors or omissions, as well as deficient products. If the entire system, including applications software, is developed by one vendor, this testing may be included in one comprehensive system test. Acceptance should include the following activities:

a. Test results.

(1) Hardware, software, and data communication. Evaluate the technical performance of these items using the criteria presented in equipment performance specifications, data communications specifications, and RFP's. Unlike individual evaluations, however, emphasis is placed on interface characteristics such as I/O and CPU time ratios, processing mixes, and communications and queuing efficiency. Also, evaluate volume (data and processing) dependencies, capacities and system saturation points, backup, recovery, problem analysis, and ability to monitor the system performance.

(2) Environment. Evaluate the facility according to facility design specifications. Tests for stress and efficiency should be made on such requirements as power (distribution, surges, cycle and voltage fluctuations, and damage due to sudden losses), heat, air conditioning, humidity, construction, maintenance access to equipment, safety, and security.

(3) Applications software. This is not a test of the actual software, but is a test to ensure that the software will run on the system. The test ensures that the operating system, utilities, compilers, communications, and hardware performs properly. The development test data and software used by development personnel may be used. This part of the test is not necessary if the applications software was developed on the permanent configuration.

b. Responsibility. Identify by name, organization, and function, the personnel who design, conduct, review, and approve the test.

c. Operation training. List the personnel by title, grade, and training level who have been, or will be, trained on the system operation. This is not the same as operation training for the production application software. Show the vendor or other backup sources.

d. Support. Identify system support including on-site or immediate-access vendor representatives, engineering and maintenance support (including preventative maintenance schedules and system down contingencies). Identify and plan for acquisition of ADP supplies, such as disk packs, tapes, special forms and paper, and logs.

e. Changes. Identify changes to the functional requirements or specifications, and show how the changes have been evaluated. Identify requirements omitted or improved during testing or test preparation. Show how these changes were included in the system.

f. Action. List the deficiencies and recommendations.

44. Data base validation. The complete system test will verify the inclusion of all data elements, test each access, and ensure the capability to accommodate all conditions. Data base validation measures the data base technical capabilities against design specifications. It also, by using the test data base or other validation data, ensures the accuracy of the design specifications by verifying access and manipulation requirements. The validation includes:

a. Data. List each data base, the access keys, and manipulation requirements (this can be extracted from the data base design).

b. Test results. Show the test design procedure for accessing the data base and validating the design requirements. Test data may be developed or program/system test data files may be used. Summarize the test results.

c. Responsibility. Identify by name, organization, and function personnel who design, conduct, and review the test.

d. Action. List the deficiencies and recommendations.

45. System test. The system test is the final evaluation before a system becomes operational. No development activities are to be performed after the system test is approved. Before the system test is conducted, the following must be completed:

a. Development test;

b. Hardware and software acceptance; and

c. Data base validation.

The software will be transferred to, and secured at, the production facility when the development organization believes their efforts complete.

Whenever possible, the system test is to be conducted by an independent team with development personnel available as advisors.

Evaluate the system according to the system test plan. This includes generating specified outputs (file dumps, reports, etc.). The user is responsible for verifying the output accuracy. System test activities include:

a. Test evaluation. Conduct the system test under the system test plan. Document all deficiencies and recommend solutions. Note system test plan changes and include the reasons and authorization.

b. Records. Maintain processing and output records. Include run sequence and time data; this will be used in preparing the Data Processing Manual, and User and Operation Instructions.

c. Approvals. Obtain the approvals/comments/recommendations as required by the System Test Plan (see ch. 4-9b).

46. User acceptance. System test data is designed to generate sequences and output values to be compared with known results. The user makes these comparisons.

a. Review materials. List the output from the system test and the user assigned to review it. Materials required by the acceptance plan will be reviewed and accepted, or corrective action recommended.

b. Time. Analyze the processing and job run time data, and the output, to determine time and sequence dependencies.

c. Test results. The test data was designed to generate values to be compared with manually determined values (or those generated by a previous process). These values provide calculation, manipulation, and processing accuracy as required by the functional requirements and program specifications. All discrepancies are to be listed, including layout formatting, titles, and spelling.

d. Approvals. Obtain the appropriate approvals for pass, fail or conditional acceptance, and a deficiency of items that will not prevent system implementation, but which must be corrected.

47. Application software. Secure the system (no changes allowed) when it has been tested and accepted. The application system, in addition to the documentation in the data processing manual (in ch. 8), will be documented by code listings. These should include:

a. A directory of each command and applications program in the system;

b. Command listings; and

c. Source code listings.

48 and 49. Reserved.

PART 7. SYSTEM IMPLEMENTATION

50. Production initiation notice. Notify all organizations affected by the system implementation date. State how it affects them, and what they must do for preparation. The operation organization concurs on the established implementation date. The notice will include:

a. Schedule. Give the date and time for system implementation and phased activities.

b. Effect. Give a summary of the effects of the new system, and explain the differences between the old and new systems.

c. Coordination. Specify what activities must be completed by the users to assist in system implementation.

d. Contacts. List personnel contacts for the system.

51. Software control procedures. These procedures will be used after system acceptance. Software control procedures are used to: Maintain software integrity; minimize life cycle software costs; prevent unnecessary or marginal changes; establish change priorities; assure prompt action on changes; document the changes; and control the release of changed software and documentation.

The procedures are for: Production problems (abort conditions - critical); enhancements (additional requirements); deficiencies (non-critical to production); and performance improvements (system operating improvements - transparent to the user). The software control procedures include:

a. Submission. Submit changes with the following information:

(1) Description. A narrative (not specifications) of the requested change and the justification for it.

(2) Specifications. The technical specifications for the change.

(3) Impact. How the change affects other segments of the system.

(4) Resources. The level of effort required for making and documenting the change. Show how benefits exceed cost.

b. Approval. Establish an approval process for changes.

c. Technical procedure. Specify how the software will be developed, tested, and transmitted to the operational system (passing libraries, tapes, etc.).

d. Responsibility. Identify responsibility for each step of the change process.

e. Logs and statistics. Determine the information needed to record, monitor, and report software changes, and specify how the information will be obtained.

f. Version releases. Establish how, when, and by whom change notices and releases will be scheduled, approved, and distributed.

52. Production acceptance. The system is considered operational and no longer developmental after production acceptance. Software changes are to be made by maintenance programers, not development programers. Transferring operational responsibility includes:

a. Production simulation. Operations personnel, in addition to equipment and vendor software training, will be trained to run the applications system. Before transferring the operational responsibility, ADP development and user personnel ensure that operations personnel can efficiently and effectively run the system, including restart, recovery, and backup. An evaluation of the system's capability, emphasizing actual and potential problems, should be prepared with a recommendation relative to transferring the system to an operational mode.

b. Documentation. Make a documentation needs assessment. Show the status of vendor reference and operating documentation and evaluate the Operation Manual. Identify deficiencies and make recommendations.

c. Contacts. Prepare a list of contacts, giving name, home and office telephone numbers, alternate personnel, and authority level. ADP and user personnel will use these contacts for problems and emergencies.

d. Approvals. List the officials required to approve the production initiation, and obtain their signatures.

e. Implementation. State the time and date of the first production run, special conditions, and the personnel who are on call or who will be present for the start-up.

53. User instructions. The user instructions are references for the preparation of input data and parameters, the selection of processing alternatives, and the interpretation of results. A user manual should include:

a. General information.

(1) Summary. Summarize the application and general functions of the system.

(2) Environment. Identify the user organization and facility in which the software is installed and/or maintained.

b. Application.

(1) Description. Describe when and how the software is used, and the unique support provided to the user organization. The description includes:

(a) Purpose of the software;
(b) Capabilities and operating improvements; and
(c) Functions performed.

(2) Operation. Compare the operating relationships of the functions with the organization that provides input to, and receives output from, the software. Describe security and privacy considerations. Include charts with input and output responsibility.

(3) Equipment. Describe the equipment.

(4) Structure. Show the structure of the software and describe the role of each component in the operation of the software.

(5) Performance. Provide:

(a) Quantitative information on inputs, response time, processing times, and error rates.

(b) Qualitative information about flexibility and reliability.

(6) Data base. Describe data files that are referenced, supported, or kept current by the software. Include the purpose for each data file.

(7) Inputs, processing, and outputs. Describe the inputs, the flow of data through the processing cycle, and the outputs. Include relationships among inputs or outputs.

c. Procedures and requirements. Provide initiation information and procedures for preparation of data and parameter inputs. The scope, quality, and logical arrangement of the information should enable the user to prepare inputs and understand outputs. Describe error, recovery, and file query procedures and requirements.

(1) Initiation. Describe step-by-step procedures to initiate processing.

(2) Input. Define the requirements for preparing input data and parameters. Typical considerations are:

(a) Conditions (e.g., personnel transfer, out-of-stock);

(b) Frequency (e.g., periodically, randomly, as a function of an operational situation);

(c) Origin (e.g., personnel section, inventory control);

(d) Medium (e.g., keyboard, punched card, magnetic or paper tape);

(e) Restrictions (e.g., priority and security handling, limitations on files that may be accessed by this type of transaction);

(f) Quality control (e.g., instructions for checking reasonableness of input data, action to be taken when data appears to be in error, documentation of errors);

(g) Disposition (e.g., instructions necessary for retention or release of all data files received, other recipients of the inputs); and

(h) Format (e.g., input forms and instructions for preparation).

(3) Output. Describe the output requirements. Typical considerations are:

(a) Use (by whom and for what purpose);

(b) Frequency (e.g., weekly, periodically, on demand);

(c) Variations (modifications that are available to the basic output);

(d) Destination (e.g., computer area, remote terminal);

(e) Medium (e.g., printout, CRT, type, cards);

(f) Quality control (e.g., instructions for identification, reasonableness checks, editing and error correction);

(g) Disposition (e.g., instructions for retention, release, distribution, transmission, priority, and security handling); and

(h) Format (e.g., output forms, layout, and instructions).

(4) Error and recovery. List error codes and the recovery procedures.

(5) File query. Give instructions for initiation, preparation, and processing of a query. Describe the query capabilities, forms, commands used, and control instructions.

If the software is queried through a terminal, provide instructions for terminal operators. Describe terminal setup or connect procedures, data or parameter input procedures, and control instructions. Reference related materials describing query capabilities, languages, installation conventions and procedures, and program aids.

54. Operation instructions. These instructions are for running the application system; personnel should already be trained on the operation of the equipment, operating system, peripheral devices, and non-application software. An operation manual should include:

a. General information.

(1) Summary. Summarize the general functions of the software.

(2) Environment. Identify the system owner, developer, user, and the computer facility where the system is installed.

b. Overview.

(1) Software organization. Provide a diagram of the inputs, outputs, data files, and sequence of operations for the software. Runs may be grouped by periods of time cycles, by organizational level where performed, or by other logical groupings.

(2) Program inventory. Identify each program by title, number, and mnemonic reference.

(3) File inventory. Identify each file that is referenced, created, or updated. Include the title, mnemonic reference, storage medium, and storage requirement.

c. Description of runs.

(1) Run inventory. List the runs possible and summarize their purposes. Show the programs executed during each run and identify options that must be determined prior to the run.

(2) Run progression. Describe the progression from one run to another. Show program and cycle run times and variations caused by data volumes, types, and input media.

(3) Run description. Organize the information for each run into a presentation which includes:

(a) Control inputs. List the run stream control statements.

(b) Operating information. Provide operating information such as:

(i) Run identification;
(ii) Operating requirements;
(iii) Initiation method, such as on request, at predetermined time, etc.;
(iv) Estimated run time and turnaround time;
(v) Operator commands and messages; and
(vi) Contacts for problems with the run.

(c) Input/output files. Provide information for files created or updated by the run, such as:

(i) File name or label;
(ii) Recording medium;
(iii) Retention schedule; and
(iv) Disposition of file.

(d) Output reports. For each output report provide information such as:

(i) Report identification;
(ii) Medium;
(iii) Volume of report;
(iv) Number of copies; and
(v) Distribution.

(e) Reproduced output reports. For those reports that are computer generated and then reproduced by other means, provide information such as:

(i) Report identification;
(ii) Reproduction technique;
(iii) Dimensions of paper or other medium;
(iv) Binding method; and
(v) Distribution.

(f) Restart/recovery procedures. Describe procedures to restart the run or recover from a failure.

d. Nonroutine procedures. Provide information about emergency or nonroutine operations, such as:

(1) Switch over to a backup system; and

(2) Procedures for turnover to maintenance programers.

e. Remote operations. Describe the procedures for running the programs through remote terminals.

55 and 56. Reserved.

PART 8. DOCUMENTATION

57. Requirements. The project leader has the responsibility for preparing the required documents with assistance from other project team members and organizational entities. Four documents are required for this phase:

a. Data processing manual;

b. User manual;

c. Operation manual; and

d. System acceptance report.

58. Data processing manual. The manual consists of an identifying cover sheet and the manual itself. Parts 2 thru 7 of this chapter describe the processes to be documented.

a. Cover sheet. The cover sheet should be like that in fig. 5-2.

b. Data processing manual. The Data Processing Manual (DPM) describes the system. For larger systems, the material will be in several volumes; however, all volumes will be in one centralized library. Any omitted area must be justified. The DPM is the official system documentation, and must contain all changes and updates to the system. This includes specification changes, program listings, changes in processing times or sequences, data definition changes, and any information relevant to a thorough understanding of the system. The organization and format of the DPM will be decided by the project leader; however, it will include the following:

(1) Equipment/software performance specifications (see ch. 5-18);

(2) Data communications performance specifications (see ch. 5-19);

(3) Facility (see ch. 5, pt. 4);

(4) System and subsystem specifications (see ch. 5-34);

(5) Data base design (see ch. 5-35);

(6) Detailed process design (see ch. 5-36);

(7) Program specifications (see ch. 5-37);

(8) Test data design (see ch. 5-38);

(9) Data dictionary (see ch. 5-39);

(10) Applications software listings (see ch. 5-47);

(11) Run description (see ch. 5-54c) - also used in the Operation Manual;

(12) Postimplementation review plan (see ch. 5-15); and

(13) Software control procedures (see ch. 5-51).

c. Distribution. The system owner prepares the distribution list. A copy must be sent to:

Systems Assurance Branch (KGSS)
18th & F Streets, NW
Washington, DC 20405

59. User manual. The user manual consists of an identifying cover sheet and the manual itself. Chapter 5-53 describes the process to be documented.

a. Cover sheet. The cover sheet should be like that in fig. 5-3.

b. User manual. Because the requirements for systems vary, a single format is not required. The manual should present in narrative and chart form the following information; (justify omitted areas):

(1) General information. (see ch. 5-53a)

(a) System description summary; and
(b) System environment.

(2) Application. (see ch. 5-53b)

(a) Description;
(b) Operation;
(c) Equipment;
(d) Structure;
(e) Performance;
(f) Data base; and
(g) Inputs, processing, and outputs.

(3) Procedures and Requirements. (see ch. 5-53c)

(a) Initiation;
(b) Input;
(c) Output;
(d) Error and recovery; and
(e) File query.

c. Distribution. The system owner prepares the distribution list. A copy must be sent to:

Systems Assurance Branch (KGSS)
18th & F Streets, NW
Washington, DC 20405

60. Operation manual. The operation manual consists of an identifying cover sheet and the manual itself. Chapter 5-54 describes the process to be documented.

a. Cover sheet. The cover sheet should be like that in fig. 5-4.

b. Operation manual. Because the requirements for systems vary, a single format is not required. The document, however, should present, in narrative and chart form, the following information; (justify omitted areas):

(1) General. (see ch. 5-54a)

(a) System description summary; and
(b) System environment.

(2) Overview. (see ch. 5-54b)

(a) Software organization;
(b) Program inventory; and
(c) File inventory.

(3) Description of runs. (see ch. 5-54c)

(a) Run inventory;
(b) Run progression; and
(c) Run description.

(4) Nonroutine procedures. (see ch. 5-54d)

(5) Remote operations. (see ch. 5-54e)

c. Distribution. The system owner prepares the distribution list. A copy must be sent to:

Systems Assurance Branch (KGSS)
18th & F Streets, NW
Washington, DC 20405

61. System acceptance report. The report consists of an identifying cover sheet and the plan itself. The processes to be documented are in pts. 2, 3, 4, 6 and 7 of this chapter.

a. Cover sheet. The cover sheet should be like that in fig. 5-5.

b. System acceptance. Because the requirements for systems vary, a single format is not required. The document, however, should present, in narrative and chart form, the following information; (justify omitted areas):

(1) System test plan (see ch. 5-9);

(2) System test results (see ch. 5-45);

(3) Benchmark plan (see ch. 5-10);

(4) Benchmark evaluation (see ch. 5-20);

(5) Hardware, software and data communications acceptance (see ch. 5-43);

(6) Data base validation (see ch. 5-44);

(7) User validation and acceptance plan (see ch. 5-11);

(8) User acceptance (see ch. 5-46);

(9) Implementation plan (see ch. 5-12);

(10) Conversion plan (see ch. 5-13);

(11) User training plan (see ch. 5-14);

(12) Copy of production initiation notice (see ch. 5-50); and

(13) Production acceptance (see ch. 5-52).

c. Distribution. The system owner prepares the distribution list. A copy must be sent to:

Systems Assurance Branch (KGSS)
18th & F Streets, NW
Washington, DC 20405

62. Reserved.

PHASE IV ACQUISITION AND DEVELOPMENT

DATA PROCESSING MANUAL

SYSTEM NAME: (title)

SYSTEM OWNER: (organization)

5-YEAR STRATEGIC PLAN FOR AUTOMATED INFORMATION REFERENCE: (activity number)

PHASE IV PROJECT LEADER: (name)
(building, room number)
(telephone)

SYSTEMS ASSURANCE ANALYST: (name)

PROJECT TEAM MEMBERS: (names, organizations)

COMPLETION DATE: _____

PROJECT LEADER	DATE	SYSTEMS ASSURANCE ANALYST	DATE

APPROVAL: CONCURRENCE:

SYSTEM OWNER	DATE	SYSTEMS ASSURANCE (KGSS)	DATE

Figure 5-2. Data Processing Manual Cover Sheet

PHASE IV ACQUISITION AND DEVELOPMENT

USER MANUAL

YSTEM NAME: (title)

YSTEM OWNER: (organization)

-YEAR STRATEGIC PLAN FOR AUTOMATED INFORMATION REFERENCE: (activity number)

HASE IV PROJECT LEADER: (name)
(building, room number)
(telephone)

YSTEMS ASSURANCE ANALYST: (name)

ROJECT TEAM MEMBERS: (names, organizations)

OMPLETION DATE: _____

PROJECT LEADER	DATE	SYSTEMS ASSURANCE ANALYST	DATE

PPROVAL: CONCURRENCE:

SYSTEM OWNER	DATE	SYSTEMS ASSURANCE (KGSS)	DATE

Figure 5-3. User Manual Cover Sheet

PHASE IV ANALYSIS AND DESIGN

OPERATION MANUAL

SYSTEM NAME: (title)

SYSTEM OWNER: (organization)

5-YEAR STRATEGIC PLAN FOR AUTOMATED INFORMATION REFERENCE: (activity number)

PHASE IV PROJECT LEADER: (name)
(building, room number)
(telephone)

SYSTEMS ASSURANCE ANALYST: (name)

PROJECT TEAM MEMBERS: (names, organizations)

COMPLETION DATE: _____

PROJECT LEADER	DATE	SYSTEMS ASSURANCE ANALYST	DATE
APPROVAL:		CONCURRENCE:	
SYSTEM OWNER	DATE	SYSTEMS ASSURANCE (KGSS)	DATE

Figure 5-4. Operation Manual Cover Sheet

PHASE IV ACQUISITION AND DEVELOPMENT

SYSTEMS ACCEPTANCE REPORT

SYSTEM NAME: (title)

SYSTEM OWNER: (organization)

5-YEAR STRATEGIC PLAN FOR AUTOMATED INFORMATION REFERENCE: (activity number)

PHASE IV PROJECT LEADER: (name)
(building, room number)
(telephone)

SYSTEMS ASSURANCE ANALYST: (name)

PROJECT TEAM MEMBERS: (names, organizations)

COMPLETION DATE: _____

PROJECT LEADER	DATE	SYSTEMS ASSURANCE ANALYST	DATE

APPROVAL: CONCURRENCE:

SYSTEM OWNER	DATE	SYSTEMS ASSURANCE (KGSS)	DATE

Figure 5-5. Systems Acceptance Report Cover Sheet

CHAPTER 6

CHAPTER 6. OPERATION AND MAINTENANCE

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Figure 6-1. Phase V Operation and Maintenance

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CHAPTER 6. OPERATION AND MAINTENANCE

PART 1. GENERAL

1. Purpose. To meet the production requirements for which the system was designed. (see fig. 6-1).

2. Objectives. The operation and maintenance phase:

a. Uses the ADP system for production;

b. Maintains and makes minor modifications to the system;

c. Evaluates hardware and software performance;

d. Monitors system cost and resource utilization; and

e. Provides feedback for the 5-Year Strategic Plan for Automated Information.

3. Tasks. The effort and level of detail are to conform to a level of resource use commensurate with the size, complexity, and importance of the system. The ADP systems management process and quality assurance reviews apply to both in-house and contracted efforts. The tasks are:

a. Manage the system operation;

b. Monitor the system performance; and

c. Maintain and modify the system as necessary.

4. Responsibilities.

a. System owners are responsible for the operation and maintenance of their systems. This includes production operations, modification, resource accounting, documentation, and the postimplementation reviews.

b. The Office of GSA Information Systems is the system owner for shared resources, and provides ADP support for those system owners without full-time ADP staffs.

c. The Office of GSA Information Systems furnishes standards and procedures for the operation and maintenance of systems, and ensures compliance through audits and reviews.

d. Each regional office is responsible for the operation and maintenance of its regionally owned systems.

5. Documentation. No systems management document is prepared and submitted during the operation and maintenance phase; however, since this phase is a continuous activity, logs, reports, and analyses are prepared and retained. Examples of information to be collected and retained are:

a. Ownership responsibilities;

b. Operation and maintenance cost;

c. Updates for the 5-Year Strategic Plan for Automated Information;

d. Hardware performance;

e. System software performance;

f. Updates to operational times, sequences, etc.;

g. Change control logs (software and hardware configuration);

h. Software version releases; and

i. Scheduled and unscheduled change requirements (including justification and cost).

6. Quality assurance. A postimplementation review is conducted within 12 to 18 months following system installation. Subsequent reviews are at 50 percent and 80 percent of the system life, but at least every five years. The Office of GSA Information Systems conducts additional audits as necessary.

7. Reserved.

Phase V Operation and Maintenance

Tasks

- Manage the System Operation
- Monitor the System performance
- Maintain and Modify the System as Necessary

Documentation

- On-going

Quality Assurance Review

- Postimplementation

Figure 6-1. Phase V Operation and Maintenance

Phase V Operation and Maintenance

Tasks

- Manage the System Operation
- Monitor the System Performance
- Maintain and Modify the System as Necessary

Documentation

- Change Log

Quality Assurance Review

- Post-Implementation

PART 2. MANAGEMENT

8. Ownership. Each ADP system has a designated system owner shown in the 5-Year Strategic Plan for Automated Information. The Office of GSA Information Systems has the ownership responsibility for resources not dedicated to one organization. The system owner (organization) appoints a representative (person) as a contact. In addition to system ownership, there is ownership for system components. Ownership is appointed for:

a. Hardware. To acquire, enhance, add, delete, and maintain computing equipment and peripheral devices.

b. Software. To maintain the software, correct latent defects, and respond to programmatic changes.

c. Data. To ensure the integrity and security of the database elements.

9. Cost accounting. The cost of operating and maintaining the system must permit job costing for scheduled runs and for special reports. Determine cost per process cycle and per report. Calculate the following incremental costs:

a. Personnel (programers, analysts, operators, etc.);

b. CPU time;

c. I/O time;

d. Connect time;

e. Memory;

f. Secondary storage;

g. Data communications;

h. Software package/utilities;

i. Facility; and

j. Supplies.

Calculate annual system operating costs as well as incremental cost and the cost for specific processes and maintenance. System operating and maintenance costs are input into the 5-Year Strategic Plan for Automated Information.

10. 5-year strategic plan for automated information. Gather information as feedback for the 5-Year Strategic Plan for Automated Information as well as for operational adjustments. Planning and control information includes:

a. Operation and maintenance costs;

b. Need for system changes due to functional requirement changes;

c. System revisions recommended by postimplementation reviews;

d. Systems management time adjustments; and

e. Identification, by activity number, of major changes (too significant to be absored as part of the maintenance activity).

11. Reserved.

PART 3. MONITORING

12. Hardware. Monitor the use and performance of the hardware components and prepare reports which will provide the following information:

a. Usage. Explain how each piece of hardware is used, why, when, and the cost for each application or allocated cost per function. Document the use rate and additional availability of each piece of hardware, except those pieces required by the system (controllers, console, etc.).

b. Outage. Record the reasons for hardware failures along with the number of failures, the outage time, and calculated proportion of down-time (where practical).

c. Extrinsic outage. Record outages not caused by system hardware, such as preventive maintenance, commerical power, air conditioning, and operator error and show the number of outages, types and times, and total outage time and proportion (where practical).

d. Trends. Analyze hardware monitoring reports to identify problem trends and develop recommendations.

e. Support. Identify and document support problems or inadequacies such as maintenance response time and parts availability.

13. System software. Monitor operating system software and utilities for discrepancies and failures, and report their performance reliability as follows:

a. Outage. Record the reasons for system software failures and the number of failures, the outage time, and the impact on the system's production schedule (where practical).

b. Extrinsic outage. Record outages not caused by system software failures or discrepancies, such as the installation of a new version, improper application or incorrect operating procedure, or incompatible hardware or other software interface and show the number of outages, types and times, and total outage time and proportion (where practical).

c. Support. Identify and document support problems such as incorrect or incomplete system software documentation or operation instructions, or lack of support in having corrections made and new versions installed.

14. Data communications. Monitor the performance of the communications components to provide the following information:

a. Usage. Monitor the traffic to identify trends of increases/decreases, saturation, contention, and imbalance among devices.

b. Efficiency. Ensure that response times are within tolerance that transmission/reception error rates are acceptable, and that devices are available. Document exceptions.

c. Outage. Record the number of communications failures, their duration, cause, and corrective action. Identify trends and recommend improvements.

d. Extrensic outage. Show the time lost, effects and trends for outages not a direct result of failure, such as upgrade and preventive maintenance.

e. Support. Document inadequacies in maintenance service and response time. Identify conflicts in perceived responsibilities concerning hardware, communications lines, and services among support organizations, and recommend solutions.

15. Applications software. Monitor the use and performance of the applications software and prepare reports which will provide the following information:

a. Usage. Monitor program accesses, run times, and I/O processes to identify imbalances or throughput bottlenecks.

b. Library. Keep the application system library current with the present and backup program versions. Remove software not used or accessed infrequently and keep it in secondary storage.

c. Errors. Document failures and errors caused by the application software and make recommendations.

d. Extrinsic failures. Document loss of applications software, loss of operational time, and errors from the software as a result of external factors such as head crashes, operating system problems, data communications, operator error, facility deficiencies, and improper hardware or software configuration. Include outage time, cause, corrective action, and recommendations to prevent similar occurrences.

e. Support. Evaluate and document support effectiveness. Include type and number of application software problems and the speed and efficiency with which they were corrected. Evaluate the accuracy of the documentation and the expertise of the support personnel.

16. Production. As changes are made to the applications and system software, equipment, and data communications, the production processing characteristics are also altered. Analyze the changes and update the Data Processing Manual (DPM), User Manual, and Operation Manual. Include updates to the number and sequence of runs in a processing cycle, the length of programs and cycle runs, and production problems and their solutions.

17. Reserved.

PART 4. CHANGE CONTROL

18. Applicability. All GSA ADP systems must use a change control process. That process and the changes made by it must be properly documented. Services and staff offices with ADP staffs make maintenance changes to the systems that they own; the Office of GSA Information Systems makes the changes for services and staff offices with no ADP staff; and, the regional offices makes changes to their regionally unique systems. A change control process is required, but it is developed and used with a resource commitment commensurate with the size, complexity, and importance of the system.

Changes must be made with the resources designated for the operation and maintenance of the system. The operation and maintenance resources requested and allocated in the 5-Year Strategic Plan for Automated Information are used only for the continued operation of the system and to keep it running as designed. Any redesign, change in functional requirements, reconfiguration, or program/system rewrites require an independent 5-Year Strategic Plan for Automated Information activity number. The activity must be conducted in accordance with ADP systems management procedures.

19. Authorization. A procedure must exist for approval of changes. The process may include a change control board or an individual who is responsible for ensuring that all changes have been properly evaluated. There should also be a process for making emergency changes. These emergency changes, however, are reviewed before they are made permanent.

20. System access. The system is to be secured from access except by the individuals assigned the responsibility for control of the production software. These individuals are responsible for ensuring that system and applications software have been tested and approved before being installed in production libraries. The production system passwords will be restricted to a very few, and changed periodically and whenever an employee no longer has a need for the password. Users, application programers, and anyone not responsible for installing the software are not to have system access. Development and testing will not be done with production programs and files, and only the personnel responsible for configuration management will install the system changes.

21. Version releases. A system is not to be changed frequently. If a large number of changes are needed, they are to be logically grouped, analyzed, made in a change library, and then tested in a system test environment. They are to be installed by a schedule, and all affected organizations are to know the changes being made in advance so that comments and adjustments can be made.

22. Unscheduled changes. When changes must be made for an emergency or to meet interface schedules, the immediacy or timing of these changes may prevent their being part of a version release. However, these changes should be documented separately and included in the system test of the next version release to ensure that they properly interface with the rest of the system.

23. Reserved.